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The Lasting Well-being Effects of Early Adulthood Macroeconomic Crises*

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Abstract

This paper studies the effects of early adulthood macroeconomic crises on subjective well-being later in life. Using repeated cross-section data of over 90 000 individuals from the World Values Survey combined with Angus Maddison's historical data on macroeconomic circumstances, I find that experiencing a macroeconomic crisis at ages 18 to 25 is detrimental to subjective well-being. Individuals who have witnessed a large decline in real GDP in their late teens or early twenties report lower levels of well-being years later. The negative effect is largest for individuals in the bottom half of a country's income distribution.

Keywords: Subjective Well-Being, Happiness, Life satisfaction, Crisis, Recession, Adaptation
JEL codes: O11, I31

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1 Introduction

There is a growing empirical literature showing that recessions experienced in early adulthood affect a variety of individual-level outcomes such as preferences on redistribution (Giuliano and Spilimbergo, 2014) and job satisfaction (Bianchi, 2013). Malmendier and Nagel (2011) have shown that past recessions are associated with individuals' risk preferences later in life. Some studies have found that labour market outcomes are also less favourable for those cohorts that graduated from college or university during a bad economy (see, for example, Oyer, 2006; Kahn 2010; Oreopoulos, von Wachter, and Heisz, 2012). However, so far there is no analysis on the lasting effects of early adulthood macroeconomic crises on individual's subjective well-being (SWB).

Macroeconomic crises experienced from age 18 to 25 can affect individual well-being later in life due to both biological and economic reasons. During the years of early adulthood, the human brain is still in the process of developing, and, because of this developmental plasticity, individuals who face unfavourable environments also experience enduring suffering in the course of their lives (Steinberg, 2014). Furthermore, Krosnick and Alwin (1989) have theorized that during these impressionable years, individual's values, attitudes and world views are formed and that they change very little in later years of adulthood. In most countries, individuals also enter the labour market between the ages of 18 and 25. Bad early experiences in the labour market can have lasting impacts on individual well-being (Bell and Blanchflower, 2011).

During times of economic turmoil, when output falls rapidly, many individuals face both unemployment and falling income. Clark, D'Ambrosio and Ghislandi (2016) show that negative changes in individual's income are associated with long lasting effects on SWB. Hovi and Laamanen (2017) have found similar results using panel data on national income and average national SWB. Clark, Georgellis, and Sanfey (2001) and Clark et al. (2008) also report lasting negative effects on SWB from experiencing unemployment. Expriences of unemployment can scar individuals to the extent that their SWB does not return to its initial level even after re-employment (Clark, Georgellis, and Sanfey, 2001; Clark et al., 2008; Knabe and Rätzel, 2011). If an individual is scarred in the early stages of his or her life, the cumulative losses in SWB during his or her life span are considerable.

This study focuses on examining the lasting well-being effects of a crisis

experienced from age 18 to 25. Using repeated cross-section data of over 90 000 individual respondents to the World Values Survey combined with Angus Maddison's historical data on macroeconomic circumstances allows us to compare the experiences between multiple birth cohorts in multiple countries. This is the first study to utilise international differences in the timing of macroeconomic crises to examine their lasting effects on individuals' SWB. The analysis shows that there is a significant negative effect from experiencing a macroeconomic crisis between the ages of 18 and 25. The negative effect on happiness lasts for at least 20 years. Furthermore, individuals with the lowest income within a country are most affected by the crisis experience.

The paper is constructed as follows. In section 2, I describe the data sets and the empirical model used in the analysis. In section 3 I present the estimation results and in section 4 I study the robustness of the results. Section 5 concludes.

2 Data and methods

2.1 Data

I use the combined World Values Survey and European Values Study data (WVS, from here onwards). WVS is a repeated cross section study conducted in different countries around the world and it includes two questions on individual well-being: happiness, measured on a scale from 1 to 4, and life satisfaction, measured on a scale from 1 to 10. In the SWB literature, answers to happiness questions are often considered to measure individual's emotional well-being, whereas answers to life satisfaction questions measure individual's thoughts about his or her life (Kahneman and Deaton, 2010). Thus, incorporating both measures into the analysis allows us to assess the lasting effects of past crises on different domains of well-being. In addition to the SWB questions, the WVS collects information on respondent's gender, relationship status, religious beliefs, educational level, employment status and position in their country's income distribution. Following the earlier empirical literature, I use these attributes as control variables in the analysis conducted in the next section.

The WVS has been conducted since 1981 but the first questionnaires that include all of the above-mentioned questions are from 1990. Thus, the time period used in the analysis runs from 1990 to 2014. However, the WVS is not

conducted annually, but in waves. There is on average six years between two questionnaires in a country. Each time the survey is conducted, about 1000 individuals are interviewed within a country. I combine the WVS data with Barro and Ursúa's (2008) data on real GDP per capita, which is based on the Angus Maddison's output time series for 40 countries. I augment Angus Maddison's real GDP per capita series with data from the World Bank's World Developent Indicators (WDI) to include years 2007–2014.[1] Thus, the early effects of the most recent crisis are included in the analysis as well. The combined SWB data includes 38 countries. Two countries are excluded because of missing data in the WVS.[2] The use of Angus Maddison's historical time series allows us to link even the older respondents in the earliest waves of the WVS with the economic situation they faced in their youth.

To link WVS respondents with the economic circumstances in their youth, I need information about the birth cohort of each individual. Most WVS surveys gather information not only on respondent's age, but also on respondent's birth year. For each individual I calculate the birth cohort as survey year minus the reported age. If this calculated birth cohort differs by more than one from the reported birth year, then the individual is excluded from the analysis. In the surveys conducted in Brazil in 1991 and in Columbia in 2005, respondents were not asked for their birth year, but I include all individuals from these surveys in the sample and calculate their birth cohort as described above.

2.2 Baseline specification

Following Barro and Ursúa (2008), and using the peak-to-trough method, I define a crisis period as one where the cumulative real GDP per capita

[1]There is no real GDP data available for Taiwan for the time period 2007–2013 in WDI. I use the IMF's World Economic Outlook data on real GDP growth to include observations for Taiwan for 2007–2013.

[2]The countries included in the sample are Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Colombia, Denmark, Egypt Finland, France, Germany, Greece, Iceland, India, Indonesia, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Turkey, United Kingdom, United States, Uruguay and Venezuela. Sri Lanka cannot be included in the sample because WVS surveys have not been conducted there. Portugal, although included in the WVS, does not have all the relevant individual level variables needed for the analysis.

decline is 10% or more.[3] Figure 2 in Appendix A shows the crisis years for each country based on this definition. As in Giuliano and Spilimbergo (2014), I link each respondent to the macroeconomic history of his or her country by creating a dummy variable $shock_{ict}^{18-25}$ equal to one, if the individual lives in a country that experienced a crisis when the individual was 18–25 years old.[4] The shock dummy equals one if at least one year is defined as a shock year during the time when the individual was 18–25. To assess the impact of these negative macroeconomic shocks on individual SWB, I use OLS to estimate

$$SWB_{ict} = \beta_0 + \beta_1 shock_{ict}^{18-25} + \beta_2 \Delta \ln(GDPpc)_{ct} + \beta_3 shock_{ct} + \\ + \gamma' X_{ict} + \delta_t + \psi_c + \eta_{cohort} + \eta_{age} + \psi_c * cohort_{ict} + \epsilon_{ict}, \quad (1)$$

where SWB_{ict} is the self-reported well-being of individual i in survey year t in country c, X_{ict} is a vector of individual specific control variables, δ_t, ψ_c, η_{age}, η_{cohort} control for year-, country-, age and birth-year specific fixed effects, respectively, and ϵ_{ict} is the error term.[5] The individual level control variables included in X are: gender (1 if male), five dummies for relationship status (married, living together as married, divorced, separated, widowed, and single/never-married as the reference group), five dummies for religious denomination (muslim, orthodox, protestant, roman catholic, other, and no religious denomination as the reference group), educational level (a dummy for completing secondary school, a dummy for attaining a university level degree, and has not completed secondary school as the reference group). After estimating models with the above control variables, I also include dummies for unemployment and income deciles in X as additional controls. To control for the current macroeconomic situation, I include $\Delta \ln(GDPpc)_{ct}$, the

[3]The time period of the GDP decline may be several years. During this period output doesn't have to decline every year, but the overall decline in output has to be at least 10% from peak to trough.

[4]Some, but not all, WVS questionnaires have collected information on whether or not respondents were born in the survey country. Where this information is available, I exclude all immigrants from the analysis. In those survey waves where this information is not available, I consider all respondents as natives. This generates measurement error to the shock variable and causes attenuation bias.

[5]In the estimation, I use population weights reported in WVS to make samples representative for each country-year specific population from which they are drawn. I scale the weights so that their average equals one in each country-year cell. For those country years without reported weights, each individual is weighted equally.

growth rate of GDP per capita and $shock_{ct}$, a dummy equal to one if country c is experiencing a crisis during the survey year t.

The coefficient of interest, β_1, is identified from the differences in experiences across birth cohorts within a country. The experiences that are shared globally and could affect SWB, such as World War II or technological progress, are controlled by the cohort fixed effects. In the baseline specification, I also control for nonlinear global age trends in SWB by including age dummies in the model. Because the identifying variation comes from the differences between cohorts within a country, I want to make sure that I am not estimating the effect of some omitted country-specific cohort trend. To rule out this possibility, I also include variables $\psi_c * cohort_{ict}$ into the model. Hence, for each country, I control for a linear trend in birth cohort.

3 Results

3.1 Baseline results

Table 1 shows the results from estimating equation (1) with OLS with country-clustered standard errors. Although the dependent variables are measured on a discrete scale, all regressions are estimated using OLS. Similar results are attained with ordered probit estimation, but OLS was chosen to keep the results comparable with the existing literature.

In column 1 of table 1, happiness is regressed on the early adulthood shock dummy, and on those control variables that can not be considered as possible outcomes of the early adulthood shock. I have, therefore, excluded dummies for education, religion, relationship status, income and unemployment from the control variables presented in the previous section. Because my focus is on examining the lasting effects of macroeconomic crises on well-being, I restrict the estimation sample to include only individuals who are older than 25 at the time of the survey. The variable of interest, $shock^{18-25}$, enters with a negative coefficient estimate, which is statistically significantly different from zero at the 1% level. In column 2 of table 1, I add controls for education, religion and relationship status. All of these variables can be affected by a crisis experienced in early adulthood and, therefore, the effect on happiness may be mediated through them. However, in column 2, the point estimate is very similar in magnitude and still statistically significantly different from zero. This implies that these variables do not mediate the effect of early

adulthood macroeconomic crisis on happiness.

Table 1: SWB and macroeconomic shocks

	(1) Happiness	(2) Happiness	(3) Happiness	(4) Satisfaction	(5) Satisfaction	(6) Satisfaction
$shock^{18-25}$	-0.038***	-0.037***	-0.039***	-0.061*	-0.057	-0.065*
	(0.013)	(0.012)	(0.012)	(0.035)	(0.035)	(0.037)
Current shock	-0.125	-0.128	-0.129	-0.004	-0.014	-0.037
	(0.084)	(0.086)	(0.080)	(0.201)	(0.215)	(0.189)
$\Delta \ln(GDPpc)$	2.758***	2.762***	2.212***	7.550***	7.568***	4.928***
	(0.717)	(0.700)	(0.747)	(1.492)	(1.460)	(1.744)
Male	-0.035**	-0.052***	-0.053***	-0.083**	-0.122***	-0.131***
	(0.014)	(0.014)	(0.013)	(0.041)	(0.043)	(0.036)
Secondary school education		0.072***	0.028*		0.241***	0.044
		(0.026)	(0.017)		(0.071)	(0.035)
University level education		0.126***	0.040***		0.519***	0.131***
		(0.025)	(0.014)		(0.079)	(0.042)
Unemployed			-0.172***			-0.547***
			(0.022)			(0.070)
Income dummies	NO	NO	YES	NO	NO	YES
Relationship dummies	NO	YES	YES	NO	YES	YES
Religion dummies	NO	YES	YES	NO	YES	YES
Age FEs	YES	YES	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES	YES	YES
Cohort FEs	YES	YES	YES	YES	YES	YES
Country FEs	YES	YES	YES	YES	YES	YES
(Country dummies)*cohort	YES	YES	YES	YES	YES	YES
Observations	96510	96510	96510	96957	96957	96957

All models estimated with OLS. Religion dummies include muslim, orthodox, roman catholic, protestant and other religion. Relationship status dummies include married, living together as married, divorced, separated and widowed. The omitted category is single/never married females with uncompleted secondary school and no religious denomination. Country-clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

If the findings from previous literature on labour market outcomes hold for international data, it is also possible that the effect of early adulthood macroeconomic crises is mediated through income rank, or through unemployment. In column 3 of table 1, I test this hypothesis by further adding a dummy for current unemployment and nine dummies for the current income rank of the individual as controls.[6] The coefficient estimate of the early

[6]In WVS surveys, the respondents are usually given a scale with ten income brackets describing income before taxes and deductions. The brackets are based on an estimate of the survey country's current income distribution. Most country-years have 10 brackets (based on country's income deciles), but some have less. Including country-years that have, for example, the ninth bracket capturing the income of the highest income group would

adulthood shock is still statistically significant at the 1% level, and similar in magnitude. This indicates that the relationship between early adulthood macroeconomic crises and happiness does not operate through unemployment and income rank. One possible channel through which macroeconomic crises could affect happiness is lower wealth accumulation of the individuals who have experienced a macroeconomic crisis. However, lower wealth, as well as income rank and employment status, are all possible outcomes of macroeconomic crises. The aim of this study is to determine whether macroeconomic crises have lasting effects on individual SWB. Examining the possible channels through which the effect is transmitted is left for future research.

In columns 4, 5 and 6, I report the results for the same models as in the previous three columns, but with life satisfaction as the left-hand-side variable. The absolute value of the coefficients in the life satisfaction models is higher because of the different measurement scale. The point estimates exhibit only little variation when adding control variables. However, the coefficient estimate of the early adulthood macroeconomic shock is statistically significantly different from zero only at the 10% level (in columns 4 and 6). One interpretation for this result is that experiencing a crisis in early adulthood affects only individuals' emotional well-being but has no effect on their life evaluation. Another possible explanation for this is that in WVS surveys, the happiness question is always asked at the early stages of the questionnaire, whereas the life satisfaction question is often asked later in the questionnaire. Thus, there is much more variation in the preceding questions for life satisfaction, especially in the earlier waves. If this results in a higher variance in the answers for the life satisfaction, it could help to explain the higher standard errors of the coefficient estimates. In fact, a comparison of the standard deviations reveals that the within country standard deviation of life satisfaction in waves 3 and 4 relative to within country standard

cause imprecision in my estimates. To be on the safe side, I have excluded all country-years that do not have all the ten income brackets represented. I include nine income decile dummies to the estimation equation, leaving the lowest decile as the reference group. The fact that I use income dummies in an analysis with multiple countries means that these variables capture the effect of income rank on SWB. Thus, the income decile dummies do not capture the effect of absolute income on SWB, but rather the effect of individual's income relative to others in that specific country-year cell (for a discussion about income rank as the measure of relative income see, for example, Mujcic and Frijters, 2012). Those individuals who have chosen not to answer questions about their income are excluded from the analysis.

deviation of life satisfaction in waves 5 and 6 is larger than the corresponding ratio for happiness.

When assessing the magnitude of the results I find, that a one standard deviation increase in the shock variable is associated with a decrease of 0.02 standard deviations of happiness and 0.01 standard deviations of life satisfaction at a point in time. The effect of the macroeconomic shock is 23% of the effect of being unemployed for happiness and 12% for life satisfaction. Although I assess the effect based on differences between individuals at a point in time here, it should be kept in mind that the cumulative losses in SWB for an individual over time are much larger.

The extent to which the descriptive results reported above describe the causal relationship macroeconomic crises and SWB depends on what is assumed about the selection bias. First, individuals who decide not to answer the SWB question might be those whose SWB is the lowest. If a crisis experience decreases future SWB, then this would imply that the estimated coefficients for the shock variable are biased towards zero. However, if, for some reason, those individuals who have experienced a crisis are more willing to report their low SWB levels than the rest of the population then the coefficient estimates would exaggerate the true effect.

The second cause for concern is the possibility that changes in SWB caused by experiencing a macroeconomic crisis affect the probability for individuals to emigrate. There is very little evidence of the effect of SWB on actual migration at the individual level, but there is some evidence showing that lower SWB could lead to a higher desire to migrate (Cai et al., 2014; Chindarkar, 2014; Otrachshenko and Popova, 2014). If individuals with lower SWB actually emigrate then the reported estimates are biased towards zero. It is also possible that individuals who have the highest SWB are the ones that actually emigrate. The coefficient of interest is also biased towards zero if those individuals who have not experienced a crisis and thus have higher SWB are the ones that emigrate.

Thirdly, if individuals with high SWB are more likely to live longer after experiencing a macroeconomic crisis than those individuals who have low SWB, then the coefficient estimates are expected to be biased towards zero. However, we do not have any direct evidence implying that early adulthood crises would result in higher mortality rates among people with lower SWB. There is some evidence that experiencing a macroeconomic boom at ages 0–25 lowers mortality (Cutler, Huang and Lleras-Muney, 2016), and some evidence that macroeconomic crises in early childhood increase mortality (Van

den Berg, Lindeboom and Portrait, 2006). In my estimates, I am not able to take into account the possible selection bias generated by non-response, emigration and mortality, but it seems very unlikely that the coefficient estimates would exaggerate the true effect of early adulthood macroeconomic crises on SWB.

3.2 Results on adaptation

The results discussed thus far, have shown the average effect of experiencing a crisis in early adulthood among all age groups over 25. I have assumed the same effect for individuals who have just experienced a crisis and for individuals who have experienced it, for example, 20 years ago. To relax this assumption, some studies have allowed for dynamic effects by including dummy variables or continuous variables measuring the years elapsed from the crisis (see, for example, Oreopoulos, von Wachter, and Heisz, 2012; Bucciol, Alessandro, and Zarri, 2015; MacLean and Hill, 2015; Rao, 2016).

I examine adaptation to macroeconomic crises by using both of these strategies. I start by constructing a variable $years\ passed_{ict}$ which is zero when the individual has not experienced a crisis at the ages of 18–25. If, on the other hand, an individual has experienced a crisis and the last crisis year was, for example, when individual was 23 years old, then years passed is calculated as $years\ passed_{ict} = age_{ict} - 23$. If a country has experienced a crisis in the years when the individual was 22–27 years old then for that individual the last year coded as crisis is when he or she was 25 (the highest age in the eight-year range interval) and years passed is $years\ passed_{ict} = age_{ict} - 25$.

In columns 1 and 3 of table 2, I have augmented the model from columns 3 and 6 in table 1 with a dummy variable ($D_{years \geq 20}$) which equals one when $years\ passed_{ict} \geq 20$. This model allows for adaptation when 20 years have elapsed since the last shock year. The effect of an early adulthood macroeconomic crisis in the first 19 years after the crisis is captured by the coefficient of $shock_{ict}^{18-25}$. Columns 1 and 3 show that the effect during the first 19 years after the macroeconomic shock is statistically significant, at the 1% level for happiness and at the 5% level for life satisfaction. When allowing for adaptation this way, the effect in the first 19 years is more negative than the average effect estimated in the previous section. The coefficient of $D_{years \geq 20}$ measures the statistical significance of adaptation. If this coefficient is statistically significant, the effect of the shock after 20 years is different from what it is during the first 19 years. For happiness, adaptation is found

Table 2: SWB and macroeconomic shocks, adaptation

	(1) Happiness	(2) Happiness	(3) Satisfaction	(4) Satisfaction
$shock^{18-25}$	-0.080***	-0.124	-0.177**	-0.302*
	(0.028)	(0.088)	(0.067)	(0.170)
$D_{years \geq 20}$	0.080*		0.218**	
	(0.040)		(0.095)	
years passed		0.007		0.019
		(0.006)		(0.013)
$years\ passed^2$		-0.000		-0.000
		(0.000)		(0.000)
Current shock	-0.136*	-0.131	-0.058	-0.043
	(0.080)	(0.078)	(0.190)	(0.186)
$\Delta \ln(GDPpc)$	2.185***	2.169***	4.855***	4.808***
	(0.698)	(0.682)	(1.634)	(1.644)
Unemployed	-0.172***	-0.172***	-0.547***	-0.547***
	(0.022)	(0.022)	(0.070)	(0.070)
Male	-0.053***	-0.053***	-0.130***	-0.130***
	(0.013)	(0.013)	(0.036)	(0.036)
Secondary school education	0.028*	0.028*	0.043	0.044
	(0.016)	(0.016)	(0.035)	(0.035)
University level education	0.040***	0.040***	0.129***	0.131***
	(0.014)	(0.014)	(0.042)	(0.042)
Income dummies	YES	YES	YES	YES
Relationship dummies	YES	YES	YES	YES
Religion dummies	YES	YES	YES	YES
Age FEs	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES
Cohort FEs	YES	YES	YES	YES
Country FEs	YES	YES	YES	YES
(Country dummies)*cohort	YES	YES	YES	YES
Observations	96510	96510	96957	96957

All models estimated with OLS. Years passed indicates how many years have passed from the crisis experience. $D_{years \geq 20}$=1 if more than 19 years have passed from the crisis experience. Religion dummies include muslim, orthodox, roman catholic, protestant and other religion. Relationship status dummies include married, living together as married, divorced, separated and widowed. The omitted category is single/never-married females with uncompleted secondary school and no religious denomination. Country-clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

to be statistically significant at the 10% level, whereas for life satisfaction it is found to be significant at the 5% level.

Often, adaptation is assumed to be faster, in absolute terms, right after the shock and slower as time passes (see, for example, Vendrik, 2013, for adaptation to income changes). In columns 2 and 4 of table 2, I allow for a quadratic adaptation process by including *yearspassed* and its square term into the model. In columns 2 and 4 of table 2, I thus estimate

$$\begin{aligned} SWB_{ict} = \beta_0 + \beta_1 shock_{ict}^{18-25} + \beta_2 \Delta \ln(GDPpc)_{ct} + \beta_3 shock_{ct} \\ + \beta_4 years\ passed + \beta_5 years\ passed^2 \\ + \gamma' X_{ict} + \delta_t + \psi_c + \eta_{cohort} + \eta_{age} + \psi_c * cohort_{ict} + \epsilon_{ict}. \quad (2) \end{aligned}$$

The coefficient of $shock_{ict}^{18-25}$, which now measures the effect of the shock when zero years have passed from the crisis experience, is not statistically significant for happiness and significant at the 10% level for life satisfaction.[7] The coefficients of *years passed* and *years passed*^{2} are not separately nor jointly significant at the 10% level in either of the models. Furthermore, though not reported in the table, there is no statistically significant adaptation found for any period after the shock for happiness or life satisfaction.[8] This suggests that it is not necessary to include these variables in the model.

Although coefficients β_4 and β_5 are not significant, I present the graphical results from estimating the effect of an early adulthood macroeconomic shock for different time periods after the crisis in figure 1. This is done to offer the reader some further insight on the average effect estimated in the previous section. In figure 1, I calculate the effect of an early adulthood crisis at t years after the crisis as $\beta_1 + \beta_4 * t + \beta_5 * t^2$. The point estimates for the effect are larger in the beginning, but the effect is statistically significant at the 5% level only after 10 years have passed since the crisis experience. The magnitudes of the effects for happiness and life satisfaction is very similar when accounting for the different measurement scale. The figure shows a somewhat faster recovery for life satisfaction than for happiness.

[7] It should be noted that there are no individuals in the sample who are currently experiencing an early-adulthood shock because the sample only includes individuals older than 25. Thus, the coefficient β_1 can be considered as that part of the effect which is common to all individuals who have experienced a crisis in early adulthood.

[8] In this model, adaptation can be tested for each period separately by testing the significance of $\beta_4 * t + \beta_5 * t^2$ with t denoting the years elapsed from the last shock year.

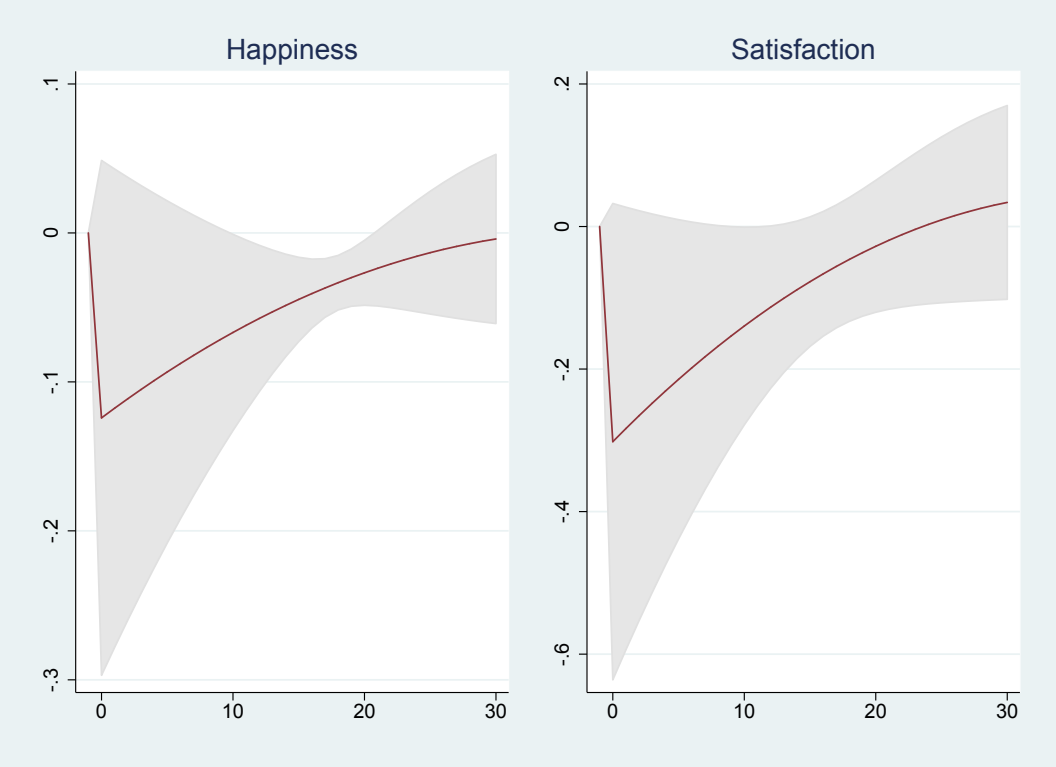

Figure 1: The effects of experiencing a macroeconomic crisis for different time periods after the crisis. The horizontal axis denotes years passed from the crisis experience. The effects on happiness are on the left panel and the effects on life satisfaction are on the right panel. The gray area shows the 95% confidence interval.

The method I use to identify the dynamic effect of crises differs from many previous studies that have looked at adaptation in SWB to different life events. In this study, the adaptation process is identified from the differences between birth cohorts within a country. Other studies have mainly used longitudinal data on individuals to study the adaptation process of SWB (Clark et al., 2008). Using repeated cross section data linked with historical output data has two advantages. First, it allows for the examination of the effects over a much longer time span. Second, this method allows us to identify the effects of experienced circumstances at a specific age, even if there is no individual level data from that age.

3.3 Heterogeneous effects

In this section, I focus on the average effects of early adulthood crises for different income deciles and also for the unemployed. Previous evidence suggests that employed individuals who graduated in a recession might, in fact, derive more satisfaction from their job, even with smaller earnings, than people who did not graduate in a recession (Bianchi, 2013). With the WVS data set, I can examine whether those low-income individuals who have experienced a macroeconomic crisis in early adulthood have higher SWB than those low income individuals who have not experienced a crisis.

To study the different associations between SWB and macroeconomic crises with WVS data, I follow Lohmann (2015) and include interaction variables in model (1). I interact the income dummies with $shock^{18-25}$ and do the same for unemployment. This allows me to examine whether employed and unemployed individuals at different points in a country's income distribution are affected differently by the macroeconomic crisis experienced in early adulthood. I also test whether those who have entered adulthood during a time of macroeconomic crisis are more sensitive or less sensitive to unemployment, and, to their own position in the income distribution.

Results from estimating the model with interaction variables are reported in table 2. All models include the same set of control variables as before. In columns 1 and 3 of table 3, I have replicated the results reported in columns 3 and 6 of table 1. I report the coefficients of the nine highest income decile dummies; the lowest-earning decile is the reference category. The coefficients of the income decile dummies in columns 1 and 3 of table 3, show that people reporting higher income rank are also happier and more satisfied with their lives.

Table 3: SWB and macroeconomic shocks, interactions

	(1) Happiness	(2) Happiness	(3) Satisfaction	(4) Satisfaction
$shock^{18-25}$	-0.039***	-0.081*	-0.065*	-0.113
	(0.012)	(0.046)	(0.037)	(0.188)
2nd Income Decile	0.058*	0.059**	0.205	0.211*
	(0.031)	(0.026)	(0.126)	(0.106)
3rd Income Decile	0.095**	0.087***	0.393***	0.391***
	(0.037)	(0.031)	(0.131)	(0.116)
4th Income Decile	0.142***	0.136***	0.609***	0.613***
	(0.032)	(0.026)	(0.157)	(0.130)
5th Income Decile	0.189***	0.183***	0.825***	0.831***
	(0.038)	(0.033)	(0.172)	(0.151)
6th Income Decile	0.211***	0.199***	0.977***	0.970***
	(0.047)	(0.035)	(0.187)	(0.149)
7th Income Decile	0.250***	0.235***	1.131***	1.113***
	(0.045)	(0.034)	(0.201)	(0.163)
8th Income Decile	0.254***	0.234***	1.194***	1.135***
	(0.056)	(0.041)	(0.220)	(0.168)
9th Income Decile	0.266***	0.245***	1.243***	1.175***
	(0.046)	(0.035)	(0.207)	(0.158)
10th Income Decile	0.305***	0.289***	1.317***	1.292***
	(0.040)	(0.036)	(0.192)	(0.153)
2nd Income Decile×$shock^{18-25}$		-0.009		-0.035
		(0.052)		(0.167)
3rd Income Decile×$shock^{18-25}$		0.034		-0.001
		(0.060)		(0.138)
4th Income Decile×$shock^{18-25}$		0.022		-0.036
		(0.043)		(0.172)
5th Income Decile×$shock^{18-25}$		0.019		-0.051
		(0.040)		(0.164)
6th Income Decile×$shock^{18-25}$		0.060		0.026
		(0.073)		(0.251)
7th Income Decile×$shock^{18-25}$		0.071		0.085
		(0.061)		(0.233)
8th Income Decile×$shock^{18-25}$		0.108		0.351
		(0.088)		(0.278)
9th Income Decile×$shock^{18-25}$		0.123*		0.471*
		(0.071)		(0.268)
10th Income Decile×$shock^{18-25}$		0.084*		0.134
		(0.046)		(0.264)
Unemployed	-0.172***	-0.193***	-0.547***	-0.589***
	(0.022)	(0.027)	(0.070)	(0.085)
Unemployed×$shock^{18-25}$		0.080***		0.170*
		(0.029)		(0.084)
shock's effect for 1st decile		-0.081*		-0.113
shock's effect for 2nd decile		-0.091***		-0.148**
shock's effect for 3rd decile		-0.048**		-0.114
shock's effect for 4th decile		-0.060***		-0.149**
shock's effect for 5th decile		-0.063***		-0.164**
shock's effect for 6th decile		-0.022		-0.087
shock's effect for 7th decile		-0.010		-0.028
shock's effect for 8th decile		0.026		0.238**
shock's effect for 9th decile		0.041		0.358***
shock's effect for 10th decile		0.003		0.021

All models estimated with OLS. Income dummies based on survey country's income distribution. The omitted category is the lowest income decile. All models include controls for current shock, $\Delta ln(GDPpc)$, gender, education, relationship status and religion. Dummies for year, country, cohort and age are included and also interactions between country dummies and continuous cohort variable. Lower panel reports the combined effect of a macroeconomic shock for each income decile separately. Country-clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

If we now turn to column 2 of table 3, we can observe how macroeconomic shocks in early adulthood affect happiness differently depending on the income decile of the individual. The coefficient of $shock^{18-25}$ captures the effect of an early adulthood macroeconomic crisis for employed individuals in the lowest income decile. The results indicate that early adulthood crisis experience is negatively associated with happiness among the lowest-earning employed individuals within a country. This effect is statistically significant at the 10% level.

For the second income decile, the effect of an early adulthood crisis is the sum of the coefficients of $shock^{18-25}$ and (2nd Income Decile)$\times shock^{18-25}$. As is reported in the lower panel of table 2, this sum is negative and statistically significantly different from zero for both happiness and life satisfaction. Therefore, employed individuals who are in the 2nd income decile and have experienced a crisis are less happy and less satisfied than employed individuals in the same decile who have not experienced a crisis. The effect is also statistically significantly different from zero in the 4th income decile for both happiness and life satisfaction. This differs from the results on job satisfaction by Bianchi (2013). In contrast, my findings show that employed individuals who have experienced a crisis do not report higher levels of happiness or life satisfaction when they are located at the lower end of the income distribution.

The coefficients of the income decile interactions reveal that individuals who have ended up higher in the income distribution suffer less in terms of happiness and life satisfaction from a past crisis experience. The other way to interpret these coefficients is that individuals suffer more from being at the lower income deciles if they have experienced a macroeconomic crisis in early adulthood. However, it should be noted that the coefficients of the interaction variables are only statistically significant at the 10% level for happiness for the lowest and for the two highest income deciles. For life satisfaction, the interaction variable is positive and significant at the 10% level for the ninth income decile.

These results imply that employed individuals who have experienced a macroeconomic shock in early adulthood could be more sensitive to the income of others. This is in line with Giuliano and Spilimbergo (2014), who find that experiencing a macroeconomic shock in early adulthood increases individuals' demand for redistribution and affects individuals' perceptions about the key determinants of success in life. Their results show that individuals who have experienced a crisis in early adulthood see luck as a more

crucial determinant for success than hard work. This could explain why high income rank is associated with higher SWB for those who have experienced a crisis.

Finally, let us analyse the effect of early adulthood macroeconomic crises on SWB of the unemployed. The coefficient of Unemployed$\times shock^{18-25}$ in table 5 captures the additional effect of the crisis experience on the unemployed. The positive sign of the coefficient implies that unemployed individuals are less affected by the crisis experience than employed individuals are. Individuals who have not experienced a macroeconomic crisis suffer more from current unemployment than those individuals who grew up in a crisis.

4 Robustness checks

4.1 Different thresholds for crisis

In the models presented in the previous section, I have followed Barro and Ursúa (2008) and Giuliano and Spilimbergo (2014) and assumed that macroeconomic crisis is defined by a 10% peak to trough decrease in real GDP per capita. This assumption results in a situation where most of the episodes defined as crises after the year 1950 occur in developing countries. Finland's crisis in the early 1990s and the most recent crises in Greece and Italy (starting from year 2008) are the only crises coded in developed countries after 1950. Thus, most of the crisis experiences of the younger cohorts identified are from developing countries. One way to test the robustness of the baseline results is to change the crisis threshold to allow smaller economic contractions to be coded as crises. I have used thresholds of 9%, 8%, 7%, 6% and 5% peak to trough decreases in real GDP per capita in defining the crisis period in the following robustness checks. Table 4 reports the results for the same models as the ones estimated in columns 2 and 4 of table 1 using the alternative crisis thresholds.

Table 4: SWB and macroeconomic shocks, alternative crisis definition

	(1) Happiness	(2) Happiness	(3) Happiness	(4) Happiness	(5) Happiness	(6) Satisfaction	(7) Satisfaction	(8) Satisfaction	(9) Satisfaction	(10) Satisfaction
Crisis threshold	9%	8%	7%	6%	5%	9%	8%	7%	6%	5%
$shock^{18-25}$	-0.040***	-0.033***	-0.012	-0.012	-0.013	-0.070*	-0.080**	-0.052*	-0.045	-0.040
	(0.011)	(0.009)	(0.007)	(0.008)	(0.008)	(0.034)	(0.038)	(0.028)	(0.030)	(0.026)
Current shock	-0.036	-0.245	-0.245	-0.246	-0.245	-0.060	-0.331	-0.332	-0.333	-0.332
	(0.093)	(0.161)	(0.162)	(0.162)	(0.162)	(0.311)	(0.419)	(0.418)	(0.418)	(0.418)
$\Delta \ln(GDPpc)$	2.617***	1.141	1.112	1.114	1.120	4.792**	2.876	2.818	2.823	2.836
	(0.901)	(0.969)	(0.970)	(0.970)	(0.970)	(2.285)	(3.156)	(3.154)	(3.156)	(3.159)
Unemployed	-0.173***	-0.173***	-0.173***	-0.172***	-0.172***	-0.547***	-0.547***	-0.546***	-0.546***	-0.546***
	(0.022)	(0.022)	(0.021)	(0.022)	(0.022)	(0.070)	(0.070)	(0.070)	(0.070)	(0.070)
Male	-0.053***	-0.053***	-0.053***	-0.053***	-0.053***	-0.131***	-0.130***	-0.131***	-0.131***	-0.130***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)
Secondary school education	0.028	0.029*	0.029*	0.029*	0.029*	0.044	0.045	0.045	0.045	0.045
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
University level education	0.040***	0.041***	0.041***	0.041***	0.041***	0.131***	0.132***	0.132***	0.132***	0.132***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.042)	(0.042)	(0.042)	(0.042)	(0.042)
Income dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Relationship dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Religion dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Age FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cohort FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
(Country dummies)*cohort	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	96510	96510	96510	96510	96510	96957	96957	96957	96957	96957

All models estimated with OLS. Threshold used for defining a macroeconomic shock reported in the second row. Religion dummies include muslim, orthodox, roman catholic, protestant and other religion. Relationship status dummies include married, living together as married, divorced, separated and widowed. The omitted category is single/never-married females with uncompleted secondary school and no religious denomination. Country-clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results in columns 1 and 2 of table 4, show that early adulthood crises defined using the 9% and 8% threshold are also statistically significantly associated with lower levels of happiness. Using a lower crisis threshold than 8%, however, results in a smaller and insignificant effect on happiness. The estimated effect on life satisfaction is also closer to zero when using smaller thresholds, but is still statistically significantly different from zero at the 10% significance level for the 7% crisis threshold. These results suggest that smaller crises experienced in early adulthood are also associated with lower SWB later in life. However, a more severe crisis in early adulthood has larger lasting impacts on SWB.

4.2 Experiencing crisis at different ages

Thus far, the focus has only been on the effects of crisis experiences in the early adulthood. It is also possible that experiencing a macroeconomic crisis at some other age has a lasting effect on individual SWB. Previous studies have not examined the age at which the scarring effect of unemployment takes place, for example. Furthermore, macroeconomic crises experienced in childhood can cause material deprivation and affect the development of an individual through a variety of channels. In this section, I assess whether experiencing a crisis at some other age is harmful to well-being later in life. Following Giuliano and Spilimbergo (2014), I have constructed six different eight-year range intervals for age (2–9, 10–17, 26–33, 34–41, 42–49, 50–57). In each column of table 5, I test the lasting effect of experiencing a crisis during one of these ages. The crisis is defined using the 10% peak to trough decrease as a threshold.

Table 5: SWB and macroeconomic shocks, alternative age ranges

	(1) Happiness	(2) Happiness	(3) Happiness	(4) Happiness	(5) Happiness	(6) Happiness	(7) Satisfaction	(8) Satisfaction	(9) Satisfaction	(10) Satisfaction	(11) Satisfaction	(12) Satisfaction
$shock^{2-9}$	0.003						-0.012					
	(0.009)						(0.022)					
$shock^{10-17}$		-0.019*						-0.030				
		(0.010)						(0.030)				
$shock^{26-33}$			-0.020						-0.025			
			(0.013)						(0.046)			
$shock^{34-41}$				-0.038**						-0.030		
				(0.018)						(0.051)		
$shock^{42-49}$					-0.033						-0.179**	
					(0.030)						(0.084)	
$shock^{50-57}$						-0.033						0.043
						(0.026)						(0.092)
Current shock	-0.118	-0.122	-0.123*	-0.128*	-0.097	-0.143**	0.051	0.050	-0.065	-0.058	0.028	-0.214
	(0.083)	(0.083)	(0.067)	(0.065)	(0.061)	(0.067)	(0.181)	(0.180)	(0.219)	(0.229)	(0.224)	(0.212)
$\Delta \ln(GDPpc)$	2.165***	2.157***	1.940***	1.702**	1.974***	1.258*	4.709**	4.652**	5.226***	5.244***	3.935**	1.676
	(0.776)	(0.765)	(0.695)	(0.636)	(0.629)	(0.720)	(1.771)	(1.782)	(1.800)	(1.806)	(1.819)	(2.402)
Unemployed	-0.157***	-0.156***	-0.184***	-0.187***	-0.169***	-0.152***	-0.488***	-0.479***	-0.590***	-0.563***	-0.550***	-0.351***
	(0.021)	(0.021)	(0.027)	(0.031)	(0.029)	(0.027)	(0.064)	(0.066)	(0.076)	(0.081)	(0.095)	(0.117)
Male	-0.052***	-0.053***	-0.050***	-0.047***	-0.047***	-0.039**	-0.109***	-0.111***	-0.131***	-0.106***	-0.103***	-0.128***
	(0.012)	(0.012)	(0.013)	(0.014)	(0.015)	(0.016)	(0.036)	(0.036)	(0.036)	(0.030)	(0.035)	(0.042)
Secondary school education	0.032*	0.032*	0.025	0.027	0.030*	0.036*	0.054	0.058	0.045	0.030	0.038	0.048
	(0.016)	(0.016)	(0.017)	(0.017)	(0.017)	(0.021)	(0.034)	(0.036)	(0.050)	(0.053)	(0.049)	(0.066)
University level education	0.048***	0.047***	0.030**	0.025	0.027*	0.038*	0.152***	0.154***	0.104**	0.077*	0.070	0.082
	(0.015)	(0.015)	(0.014)	(0.015)	(0.016)	(0.020)	(0.048)	(0.048)	(0.044)	(0.045)	(0.047)	(0.066)
Income dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
Relationship dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
Religion dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
Age FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
Year FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
Cohort FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
Country FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
(Country dummies)*cohort	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
Observations	118183	117174	75172	54762	37253	23181	118698	117691	75525	55013	37423	23308

All models estimated with OLS. Superscript in the shock variable denotes the age at which shock is experienced. Shock is defined using 10% peak to trough decrease in real GDP per capita in every column. Religion dummies include muslim, orthodox, roman catholic, protestant and other religion. Relationship status dummies include married, living together as married, divorced, separated and widowed. The omitted category is single/never-married females with uncompleted secondary school and no religious denomination. Country-clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Columns 1–6 and 7–12 in table 5 report the effect of experiencing a crisis at different ages on happiness and life satisfaction, respectively. Only individuals who are older than the upper bound of the interval are included in the analysis. Thus, the focus is, again, on the lasting effects of past crises.[9] Models presented in columns 1 and 7 of table 5 have the largest samples because they include all individuals older than 9. In all of the models in table 5, I have used the 10% peak to trough decrease in real GDP per capita as the threshold for the crisis.

The results in column 2 of table 5 show that experiencing a crisis at ages 10–17 has a small negative impact on happiness, which is significant at the 10% level. Experiencing a crisis at ages 10–17 has no statistically significant effect on life satisfaction. Observing columns 5 and 10 of table 5 shows that, for individuals older than 41, there exists a significant effect of experiencing a crisis when 34–41 years old on happiness but not on life satisfaction. Experiencing a crisis at ages 42–49 has no statistically significant effect on happiness, but a significant effect on life satisfaction at the 5% level.

Together, these results suggest that experiencing a severe recession later in life has some effect on SWB. Though not reported here, the effect of a crisis experience in later life is most prominent for unemployed individuals. This would suggest that the combination of experiencing a crisis in later working life and being unemployed after the crisis is associated with lower SWB. The same does not hold for individuals who have experienced a crisis at ages 18–25. As discussed in section 3.3, the negative effect of early adulthood crisis experience is larger for the employed.

4.3 Placebo treatments

To further test the robustness of the baseline results presented in table 1, I follow Giuliano and Spilimbergo (2014) and create placebo treatments by assigning each individual with the macroeconomic history of another, randomly selected country. If this country experienced a macroeconomic shock when the individual was 18–25 years old, then the placebo shock dummy equals 1. In table 6 in appendix B, I have replicated the results presented in table 1 using the placebo shock dummy as the explanatory variable. The results show that there is no statistically significant association between the

[9]When examining the effects of crises experienced later in life, there is a larger share of individuals who have experienced the crisis recently.

placebo shock dummy and the SWB variables. This supports the idea that the baseline model is identifying the effect of an early adulthood macroeconomic crisis on SWB.

5 Conclusion

In this paper, I have shown that individuals who have experienced a severe macroeconomic crisis when they were 18–25 years old report lower levels of happiness and life satisfaction than the rest of the population. The most vulnerable individuals in terms of subjective well-being are those who end up at the lower end of the income distribution. I have also presented some evidence indicating that individuals who have experienced a macroeconomic crisis in early adulthood are more sensitive to the income of others. The role of early adulthood crisis experience as a moderator for the effect of relative income should be further examined in future studies. In addition, future research should focus on determining the specific channels through which early adulthood crisis experiences are associated with subjective well-being.

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APPENDIX A: Crisis years

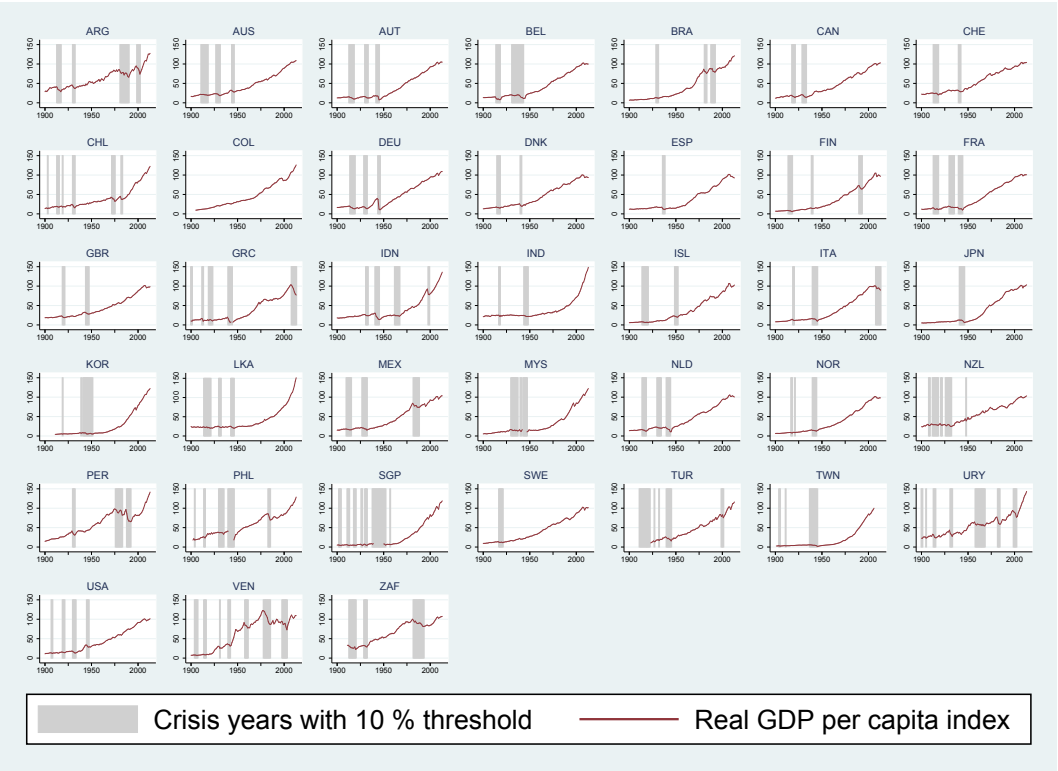

Figure 2: Crisis years using the 10% peak to trough decrease in real GDP per capita as the condition for crisis. The years considered as crisis are highlighted for the 38 sample countries. I have followed Barro and Ursúa (2008) in defining all the years when the GDP variable is missing as crisis years.

APPENDIX B: Placebo treatment

Table 6: SWB and macroeconomic shocks, placebo treatment

	(1) Happiness	(2) Happiness	(3) Happiness	(4) Satisfaction	(5) Satisfaction	(6) Satisfaction
$shock^{18-25}$	0.008	0.008	0.008	-0.021	-0.021	-0.022
	(0.005)	(0.005)	(0.005)	(0.019)	(0.019)	(0.020)
Current shock	-0.122	-0.125	-0.125	0.002	-0.009	-0.030
	(0.084)	(0.086)	(0.081)	(0.200)	(0.214)	(0.189)
$\Delta \ln(GDPpc)$	2.751***	2.755***	2.205***	7.541***	7.561***	4.918***
	(0.732)	(0.714)	(0.764)	(1.508)	(1.473)	(1.767)
Male	-0.035**	-0.052***	-0.053***	-0.084**	-0.122***	-0.131***
	(0.014)	(0.014)	(0.013)	(0.041)	(0.043)	(0.036)
Secondary school education		0.072***	0.028		0.241***	0.044
		(0.026)	(0.017)		(0.071)	(0.035)
University level education		0.126***	0.040***		0.519***	0.131***
		(0.025)	(0.014)		(0.079)	(0.043)
Unemployed			-0.172***			-0.546***
			(0.022)			(0.070)
Income dummies	NO	NO	YES	NO	NO	YES
Relationship dummies	NO	YES	YES	NO	YES	YES
Religion dummies	NO	YES	YES	NO	YES	YES
Age FEs	YES	YES	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES	YES	YES
Cohort FEs	YES	YES	YES	YES	YES	YES
Country FEs	YES	YES	YES	YES	YES	YES
(Country dummies)*cohort	YES	YES	YES	YES	YES	YES
Observations	96510	96510	96510	96957	96957	96957

All models estimated with OLS. Each individual is assigned with a macroeconomic history of another randomly selected country. $shock^{18-25} = 1$ if the randomly selected country experienced a 10% decrease in real GDP per capita when the individual was 18–25 years old. Country-clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$